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CORRELATION BETWEEN CLINICAL PRESENTATIONS AND RADIOLOGICAL FINDINGS IN PATIENTS OF LUMBOSACRAL RADICULOPATHIES

Neurosurgery

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ABSTRACT

Objective. To study the correlation between clinical presentations and radiological findings in patients of lumbosacral radiculopathies. **Methods.** In this retrospective study, data were collected from patients with radiologically proven disc prolapse at L4-5 and L5-S1 levels. This study was conducted in the Department of Neurosurgery, Himalayan Institute of Medical Sciences (HIMS), Swami Ram Nagar, Dehradun, by recruiting data of patients from January 2019 to December 2021 (3 years). Clinical findings and radiological characteristics were studied. Based on the clinical findings of the patients, correlation with radiological findings was evaluated. **Results.** A total of 313 patients managed surgically were assessed, out of which 166 males and 147 females were present. L4- 5 PIVD was the most frequently involved segment followed by L5- S1, L4- 5 canal stenosis and L4- 5, L5- S1 canal stenosis. Statistically significant correlation was noted for extensor hallucis longus weakness and decreased sensory perception in L5 dermatome in establishing diagnosis of L5 radiculopathies. Statistically significant correlation was seen with diminished or absent ankle jerk and decreased sensation in S1 dermatome to diagnose S1 radiculopathies. **Conclusions** We can conclude from our study that clinical neurological examination findings can be used as a significantly good factor to predict the level of involvement in L4-5 and L5-S1 paracentral disc prolapse in MRI.

KEYWORDS

Radiculopathy; disc prolapse; correlation; surgery; Clinical evaluation

INTRODUCTION

In this modern era lower backache is one of the common problems being treated by medical practitioners, with about 80% of population is suffering during their entire life span. (1). Hence one of the major public health issues which needs proper assessment, treatment and care. Amongst all, lumbar canal stenosis is the most common spinal disorders which can cause pain in lower limbs and intermittent neurogenic claudication, with or without low back pain. (2, 3, 4). In third and fourth decade of life herniation of intervertebral disc at lumbar level is commonly seen. Repetitive bending, or lifting heavy weight, often leads to lower backache which can radiate to gluteal and posterior thigh region. The radicular pain commonly extends below knee within the involved nerve root myotome or dermatome. (4)

Lumbosacral radiculopathy resulting from herniation of disc is defined as localized displacement of disc material beyond the normal margins of the intervertebral disc space which causes pain, weakness, or numbness. (5)

The clinical spectrum of lumbosacral radiculopathies ranges from from sensory symptoms (paraesthesia) to motor weakness and sphincteric disturbance or even cauda equina syndrome. Lumbosacral disc prolapse, age related degeneration of spine, canal stenosis, trauma, malignant and inflammatory pathologies results in lower back pain. Lumbar disc herniation is commonly found among these aetiologies (6).

In few patients herniation of intervertebral disc upto some extent may be asymptomatic but can lead to severe nerve root impingement in many others. The clinical assessment plays an important role which leads to final diagnosis of the disc herniation. With varying range of clinical spectrum it requires proper evaluation and skills to identify exact structures involved (7).

MRI aids with clinical suspicion in confirming the diagnosis and to localize the exact pathology prior to any form of intervention (9, 10).

Such patients are one of the most common causes for admissions in Neurosurgery department of HIMS, as it is tertiary care centre. This is a retrospective study which will be done to evaluate the correlation between clinical presentations and radiological findings in patients of only L5-S1 radiculopathies.

Review Of Literature

The acute lumbosacral radiculopathy can be defined as disease process involving spinal nerve root which leads to pain, numbness and weakness depending upon the severity of compression.

Many cases of lumbosacral radiculopathy are self- limiting and paraesthesia is commonest symptom. (11, 12).

Muscles receive innervation from multiple roots which helps in preservation of muscle strength. Thus, muscle strength is mostly affected in severe cases of radiculopathy. (11)

Nerve root compression can occur due to intervertebral disc herniation or spondylosis. The herniation of disc can either be due to an acute injury or secondary to chronic degeneration of the spine. The pain fibers in neighbouring tissues such as ligaments, vessels, and duramater are activated by the prolapsed disc material (13).

L4- L5 and L5-S1 areas bears the majority of the movement of the lumbar spine, hence are most vulnerable for involvement. Approximately 90% of compressive lumbosacral radiculopathies are found at these levels (14).

L5 radiculopathy is seen with central disc protrusion at L2- 3 or L3- 4, lateral disc prolapse at L4- 5, or due to far lateral disc protrusion at L5-S1 level. Amongst the varying clinical spectrum of lumbar radiculopathy about 63- 72% patients experience paraesthesia, 35% have radiation of pain in lower extremities and 27% patients will present with numbness in root distribution. (12) About 37% of lumbosacral radiculopathy patients will harbour weakness of involved muscle, absent or diminished ankle jerk in 40%. (15, 16, 17)

In L5 radiculopathy, symptomatology includes lower backache, often radiating to lateral aspect of leg and further up to foot region. On examination reduced muscle power in extension of great toe (extensor hallucis longus) and dorsiflexion of foot is found. In chronic L5 radiculopathy marked wasting of extensor digitorum brevis is seen frequently (11)

In S1 radiculopathy lower back pain which most often radiates gluteal region and further to posterior region of leg, foot or the saddle region.

On neurological examination numbness in lateral aspect of foot and plantar flexion of foot is weak. The ankle jerk can be absent or diminished. (11)

The patients of lumbosacral radiculopathy needs proper evaluation and can be treated either conservatively or surgically. Medical management includes acetaminophen, nonsteroidal anti-inflammatory drugs (NSAIDs), and physiotherapy. (20, 21, 22). The non- surgical management options including epidural analgesia, sacroiliac joint injections, regional block of facet joint and radiofrequency ablation are beneficial in selected cases of lumbosacral radiculopathy. In patients with extruded disc faster relief in radicular pain and functional improvement was noted after surgery. In 2020 it was studied that better improvement is seen in surgical group when compared to patients managed conservatively for persisting herniated disc at 12 months (23). As per the 2016 NICE guidelines spinal decompression is recommended in patients with radicular pain who are not improving with non surgical management and radiological findings are consistent with radicular symptoms (24).

AIMS AND OBJECTIVES:

To assess the correlation between clinical presentations and radiological findings in patients of lumbosacral radiculopathies.

MATERIAL AND METHODS

This retrospective study was conducted in the Department of Neurosurgery, Himalayan Institute of Medical Sciences (HIMS), Swami Ram Nagar, Dehradun, by recruiting data of patients from January 2019 to December 2021 (3 years).

Selection Of Subjects:

Inclusion Criteria:

1. All patients who present with lower backache.
2. Patients with L5, S1 radiculopathy confirmed radiologically.

Exclusion Criteria:

3. Patients with history of trauma to lower back.
4. Patients with cauda equina syndrome.
5. Elsewhere operated patient of lumbosacral radiculopathies.
6. Patients with listhesis and spondylodiscitis.

Study Tools:

Questionnaire (closed- response format questionnaire) was filled using discharge summary of patients. Patient history, clinical examination and radiological findings studied on the MRI scan were included.

Study Protocol:

Discharge summaries of all the patients who fulfill the inclusion criteria were collected and data was categorized.

Detailed recording of history including presenting symptom, comorbid condition, past history. Complete physical and neurological examination pertaining to L5 and S1 radiculopathies were noted. MRI Lumbosacral spine findings were recorded.

Data Management And Statistical Analysis:

Data obtained by case reporting forms were analyzed using SPSS software, version 22. Interpretation of results obtained was carried out. The result data obtained was evaluated using standard statistical tests such as. p value, student t test. The value less than 0.05 was considered statistically significant.

RESULTS

During the study period 313 patients managed surgically in our hospital were found to have L5- S1 radiculopathies. The clinical diagnosis was confirmed with radiological evidence of each subject and were included in this study.

There was preponderance of males in the study. Amongst the 313 patients there were 166 males and 147 females in the study.

Table-1

Diagnosis	Frequency	%
L4- 5 PIVD	149	47.69%
L5- S1 PIVD	98	31.3%
L4- 5 canal stenosis	29	9.26%
L4- 5, L5- S1 canal stenosis	20	6.38%
L5- S1 canal stenosis	4	1.2%
L4- 5 PIVD, L5-S1 canal stenosis	1	0.32%
L4- 5 canal stenosis L5-S1 PIVD	1	0.32%
L4- 5, L5-S1 PIVD	11	3.51%
Total	313	100.00%

As shown in table 1, L4- 5 PIVD was the most frequently involved segment followed by L5- S1, L4- 5 canal stenosis and L4- 5, L5- S1 canal stenosis.

Table- 2

L4- 5 PIVD on MRI	Present		Absent		Significance
	Frequency	%	Frequency	%	
Extensor hallucis longus weakness	141	94.6%	08	6.4%	Chi square- 101 p-value= <.001
Ankle dorsiflexion weakness	85	57.05%	64	42.95%	
L5 dermatomal sensory deficit	143	95.97%	06	4.02%	
Heel walking difficulty	123	82.55%	26	17.45%	

Table- 3

L4- 5 canal stenosis on MRI	Present		Absent		Significance
	Frequency	%	Frequency	%	
Extensor hallucis longus weakness	26	89.65%	3	10.35%	Chi square- 27.9 p-value= <.001
Ankle dorsiflexion weakness	11	37.93%	18	62.06%	
L5 dermatomal sensory deficit	27	93.10%	2	6.89%	
Heel walking difficulty	19	65.51%	10	34.48%	

There was significant correlation noted for extensor hallucis longus weakness and decreased sensory perception in L5 dermatome in establishing diagnosis of L5 radiculopathies as depicted in table 2 and 3.

Table- 4

L4- 5, L5- S1 canal stenosis on MRI	Present		Absent		Significance
	Frequency	%	Frequency	%	
Extensor hallucis longus weakness	9	45%	11	55%	Chi square- 50.91 pvalue= <.0001
Ankle dorsiflexion weakness	2	10%	18	90%	
L5 dermatomal sensory deficit	15	75%	5	25%	
Heel walking difficulty	3	15%	17	85%	
Ankle jerk findings	12	60%	08	40%	
S1 dermatomal sensory deficit	17	85%	3	15%	
Plantar flexion of foot	2	10%	18	90%	
Difficulty in Walking on toes	12	60%	8	40%	

Table 3 and 6 showed significant correlation of sensory deficit in involved dermatomes with varying frequency of other evaluated signs in this study. In table 4 significant correlation was seen with diminished or absent ankle jerk and decreased sensation in S1 dermatome to diagnose S1 radiculopathies.

Table- 5

L5- S1 PIVD on MRI	Present		Absent		Significance
	Frequency	%	Frequency	%	
Ankle jerk findings	87	88.77%	11	11.23%	Chi square= 217.8 Pvalue= <.001

S1 dermatomal sensory deficit	93	94.89%	5	5.10%	
Plantar flexion of foot	15	15.30%	83	84.69%	
Difficulty in Walking on toes	90	91.83%	8	8.16%	

Table- 6

L4- 5, L5-S1 PIVD on MRI	Present		Absent		Significance
	Frequency	%	Frequency	%	Chi square-29.82
Extensor hallucis longus weakness	7	63.63%	4	36.36%	P,value= <.001
Ankle dorsiflexion weakness	9	81.81%	2	18.18%	
L5 dermatomal sensory deficit	11	100%	0	00%	
Heel walking difficulty	7	63.63%	4	36.36%	
Ankle jerk findings	4	36.36%	7	63.63%	
S1 dermatomal sensory deficit	11	100%	0	0.00%	
Plantar flexion of foot	3	27.27%	8	72.73%	
Difficulty in Walking on toes	3	27.27%	8	72.73%	

DISCUSSION:

Magnetic resonance imaging of spine is highly sensitive tool to detect structural lesion. We conducted our study to find out the correlation between MRI findings and specific neurological examination in patients of L5- S1 radiculopathies only.

In our study, there was statistically significant association between abnormal physical examination findings (absent ankle jerk, impaired sensation, and EHL weakness) and nerve root compression in MRI similar to previous studies [5, 8]. This would suggest that abnormal physical examination findings can predict nerve root compression in MRI.

Soltani et al. revealed a significant agreement between the clinical findings and MRI in a study conducted in 2014. Safa Yusuf also concluded in their study that abnormal neurological findings can predict MRI findings in patients of lumbosacral radiculopathy. Tawa et al reviewed in 2017 that deep tendon reflex testing had good sensitivity in diagnosing lumbosacral radiculopathies. In contrary to our study, Iversion et al concluded in their study in 2013 that in patients of chronic lumbosacral radiculopathy clinical index test were of low accuracy in diagnosing root involvement. Dermatomal radiation of pain along with other clinical signs have diagnostic value in lumbosacral radiculopathies was concluded by Coster et al.

Our study supports current practice of considering MRI as the gold standard investigation in diagnosing and detecting the cause of clinical radiculopathy. MRI is sensitive in detecting structural abnormalities and correlates with clinical findings.

CONCLUSION

We can conclude from our study that abnormal neurological examination findings can be used to predict nerve root compression in MRI.

Conflict of Interest.

The authorsreportno conflict of interest concerning the materialsor methodsused in this study or the findings specified in this paper.

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